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ABSTRACT

This beginning reference manual describes PLATO IV hardware for prospective users and provides an introduction to PLATO for new authors. The PLATO terminal is described in detail in Chapter 1. Chapter 2 provides a block diagram of the PLATO IV system. Procedures for getting on line are described in Chapter 3, and Chapter 4 provides references to information about PLATO IV and PLATO lessons. Chapter 5 summarizes minimum procedures for terminal maintenance. (CH)

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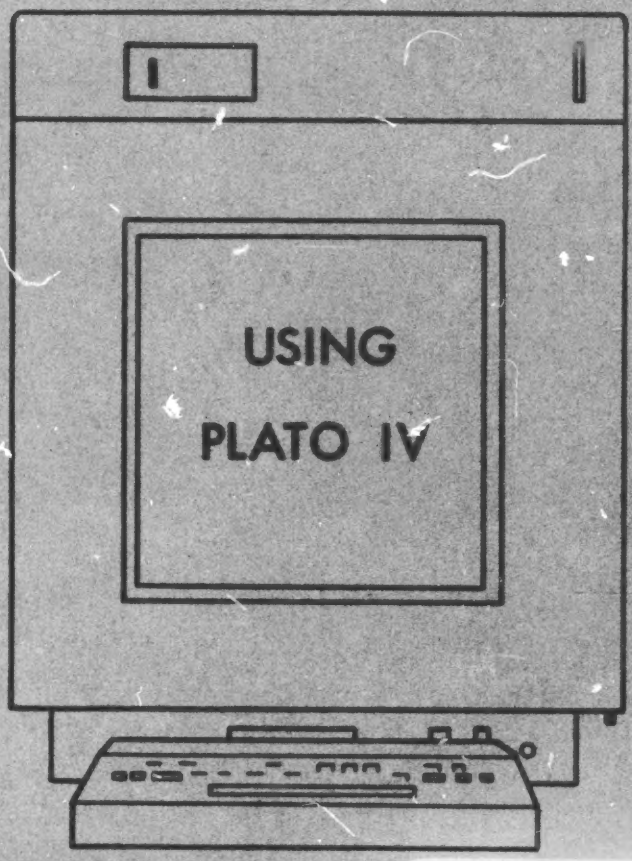

USING PLATO IV

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U.S. DEPARTMENT OF HEALTH EDUCATION & WELFARE NATIONAL INSTITUTE OF EDUCATION

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Elaine Avner extensively edited each version of this document and guided it through "rain, snow, and dark of night" to get to the printer.

All of us hope that you find this document helpful.

Table of Contents

Page

Preface

Chapter 1. The Terminal. 1.1
On the Front 1.3
On the Back. 1.5
Output Devices 1.6
Input Devices. 1.10
References 1.13

2. The PLATO IV System 2.1
References 2.4

3. Getting On-Line 3.1
References 3.2

4. Using PLATO IV. 4.1
Introduction 4.1
General. 4.3
Author 4.7
Instructor 4.13
Student. 4.14

5. Maintenance 5.1
References 5.1
Troubleshooting Procedure. 5.2

Glossary. A.1

Hardware Statistics B.1

Requesting File Space C.1

Index

PREFACE

The purpose of this document is to describe the PLATO IV hardware for prospective users, to provide an introduction to PLATO for new authors, and to create the beginning of a reference manual for all users.

The chapters have been ordered according to the sequence of information a new author might require. You will find it a reasonable procedure to read the first three chapters, look at some lessons on-line at a terminal, begin your authoring activities, and then return to chapter 4 when the need arises for specific information.

This document does not deal with the TUTOR programming language except to cite references where help may be found, nor does it deal with the educational considerations of writing or using lessons.

1. The Terminal

Of the five senses, only tasting the terminal is not advised. Although smelling the terminal is permissible, it does not appear to be of any great benefit educationally. You can, however, with rather pleasant results, see, hear, and touch it. The terminal will show you pictures, drawings, and writing; it will give you messages to which you can listen. It also responds to touching: it's a sensitive thing, you know. The terminal is your means for interacting with the educational system called PLATO.

The terminal means access to the PLATO system. For all practical purposes it is, to you the user, the whole PLATO system. All system input and output is directed through or by the terminal whether you are a new user or an experienced programmer. Whether you are writing lesson material, having students take your lessons, setting up courses and curricula, reducing student data, or reviewing someone else's lessons, you are doing it at a terminal.

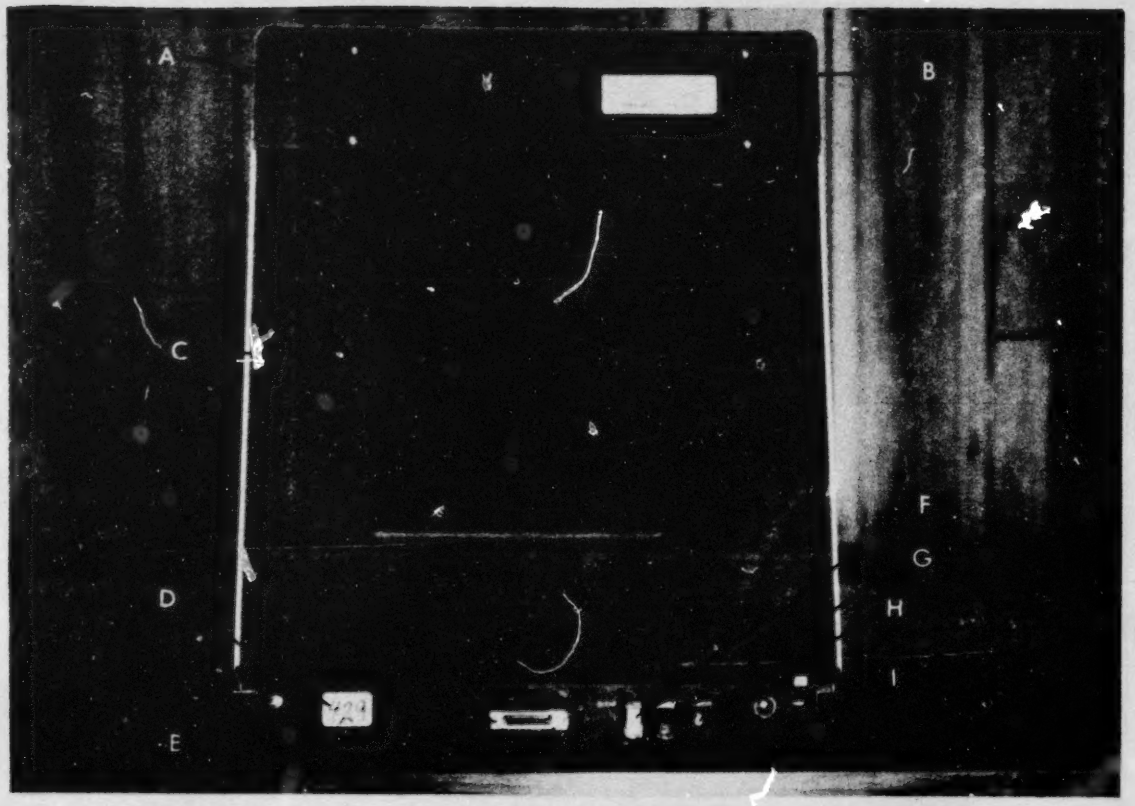


Figure 1.1 PLATO IV Terminal (Front)

The dimensions of the terminal are 18 3/8" wide, 23 1/8" high, and 25 5/8" deep (These are the greatest outside dimensions). The parts of the terminal identified in Figure 1.1 are explained below.

On the Front

A. Microfiche Access Door: Open the door, and the slide selector will automatically position itself so you can insert or remove a microfiche.

B. Focus Knob: Move the knob up and down to focus a slide on the screen.

C. Screen: The plasma panel, which displays characters and graphics, is the most commonly used output device.

D. Serial Number: This number identifies the terminal for administrative and maintenance purposes.

E. Keyset Connector: The cable from the keyset plugs in here. The keyset is the most commonly used input device.

F. Terminal Clear Switch: This switch is spring-loaded and returns to its normal position after being activated. It resets all the circuitry in the terminal and erases the screen.

G. Error Reset Switch: This switch is also spring-loaded and resets the circuitry that indicates a non-correctable communication error occurred.

H. Error Light: The error light is the visual indicator of communication errors.

I. Power Switch: The power switch turns the terminal on and off.

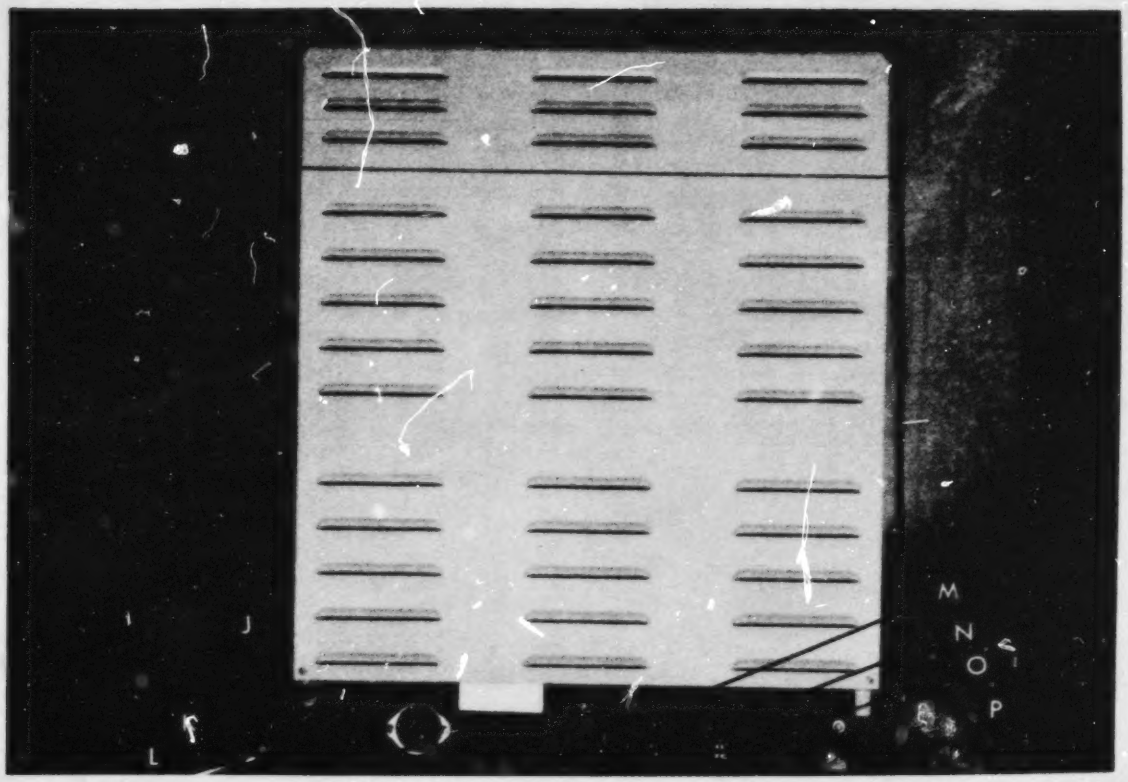


Figure 1.2 PLATO IV Terminal (Back)

On the Back

J. Air Connection: The supply connection for compressed air. Compressed air is used to drive the selection mechanism of the slide selector device. The random-access audio device (see Figure 1.4) also uses compressed air to drive its selection mechanism.

K. Line Cord Connector: The power line cord plugs into the terminal and the 115 V.A.C. 3-wire grounded wall outlet.

L. Fuse: The power line fuse.

M. External Input Jack: Equipment other than standard PLATO devices may be connected to the terminal. This jack is used to input data from the external device to the terminal.

N. External Output Jack 1: This jack is used to send data from the terminal to an external device.

O. External Output Jack 2: Same as External Output Jack 1.

P. Communications Line Connector: There are four pins in this connector. Pins #3 and #4 are the forward channel (data from the computer to the terminal). Pins #1 and #2 are the reverse channel (data from the terminal to the computer).

Output Devices

Plasma Panel: The screen (the plasma panel) is 8 1/2" square. It is made of two transparent, flat "panes" of glass, a thin layer of trapped neon and other gases, and 512 very narrow wire conductors in each pane. The wire conductors in one pane are oriented 90° to the conductors in the other pane so 512 × 512 = 262,144 separate points can be individually addressed to be turned on and off. Each point is a "dot" of orange light. A character, e.g., "C", is displayed by turning on 17 dots of light which, of course, form the pattern "C". A line may be drawn on the panel by turning on a series of dots which form a line. The writing speed of the terminal is 180 characters per second or 60 connected lines per second. The line and column configuration for displaying standard characters is 32 lines of 64 characters per line: a total of 2,048 characters may be displayed at one time.

The physics of the plasma panel is such that the panel itself has a memory. After data is sent to a terminal and displayed on the screen, there is no need to repeat the data. The computer is free to converse with other terminals and do other jobs until a change in the display is required.

The plasma panel is the most used output device. It may be thought of as an unwritten page of a book. However, in the PLATO book, we need only one page since it can be dynamically written and rewritten by the computer in an infinite combination of words and drawings.

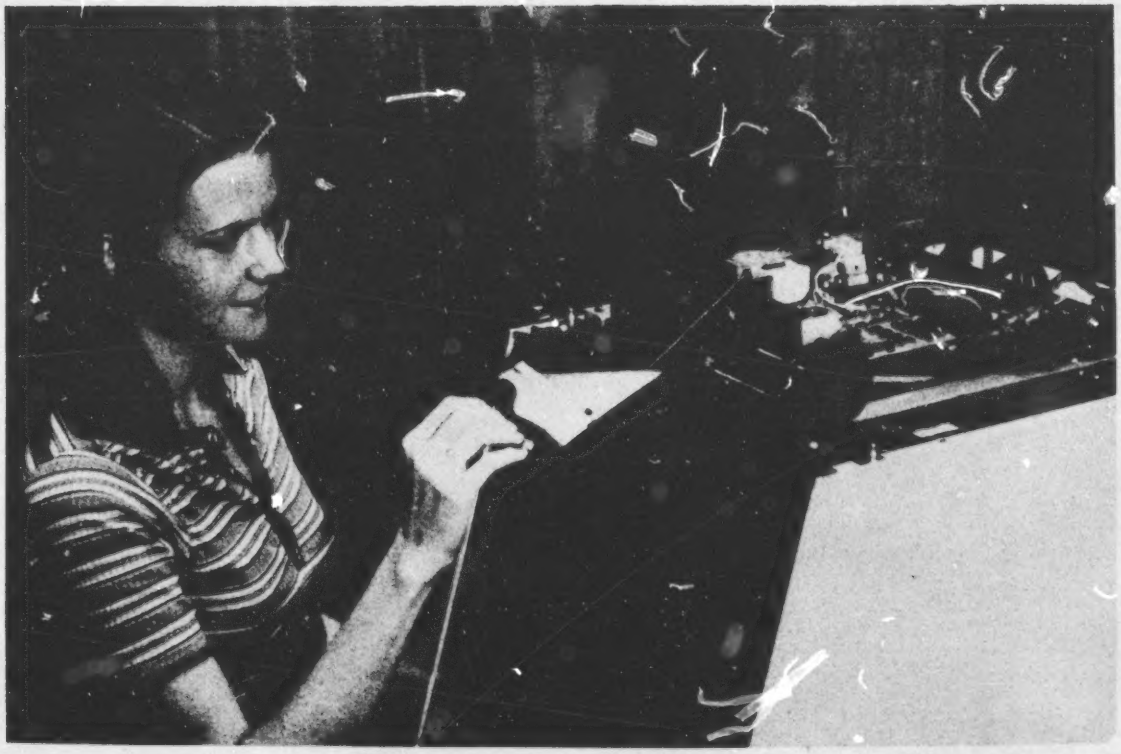


Figure 1.3 Slide Selector and Microfiche (Top of Terminal Removed)

Slide Selector: The terminal can select any one of 256 full-color slides in a "split second" and project the image onto the screen. The mechanism which does the selection and projection is called the slide selector. The flat piece of film which contains the 256 images and its acetate mount is called a microfiche. A door on the front top-left of the terminal provides access to the place in the slide selector where the microfiche is inserted.

Slides are used to present information that is relatively static. For example: a table of atomic number and molecular weight of the elements, or a list of ionization potential of gases, a photograph of

a stained bacteria culture, or a photo of evidence of a leaf disease. Slides can be used at any time in conjunction with screen graphics. For example: a slide displays the static relative location and name of the meters, dials, switches, etc., of a control panel while the computer-generated screen graphics indicate the current meter readings and dial and switch settings; a slide shows the geography of the Mississippi Valley while screen graphics indicate the current (changing) river shore lines, dam and river traffic and flood conditions.

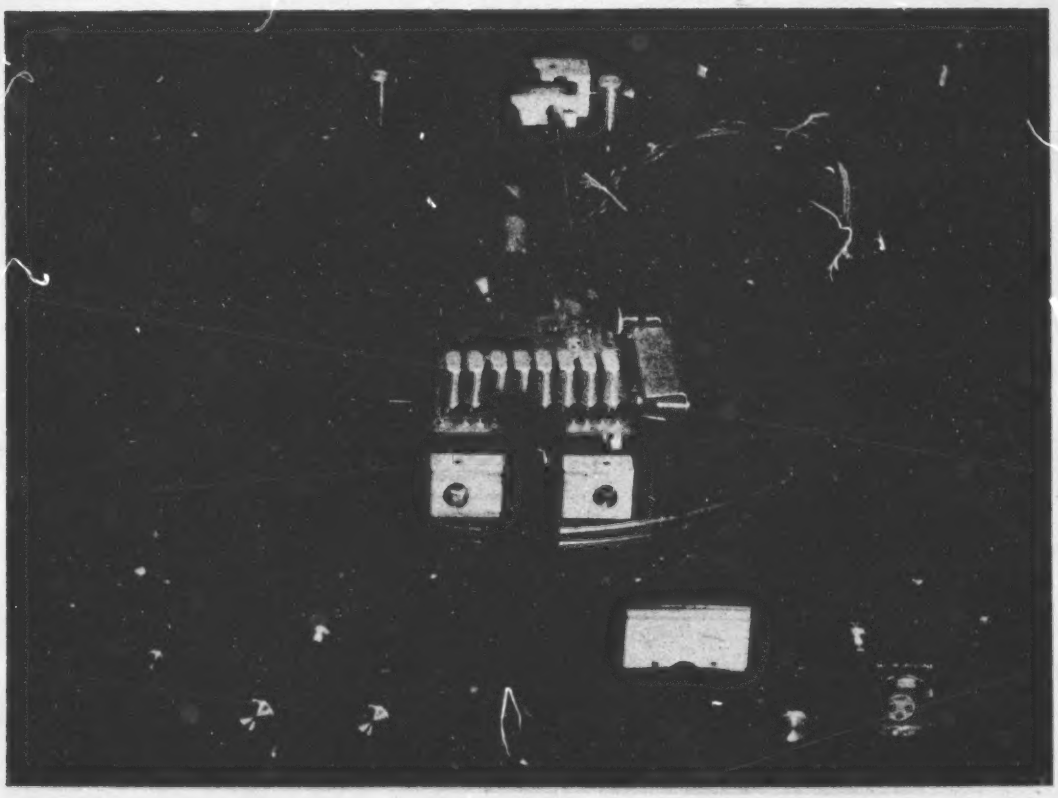


Figure 1.4 Audio Device

Audio Device: The present audio device is about 16" wide, 9" high, and 18" deep. It can select any of thousands of audio messages in about half a second and play the message for the student. The audio disk which stores the messages is shaped like a phonograph record--a flat disk 15" in diameter. The total message time on one disc is about 23 minutes. The total storage may be broken down into as many as 4,000 very brief, individually addressable messages. A single message can be played without any interruption if it is no more than 45 seconds long.

Audio messages have applications such as "telling" the student the correct pronunciation of a word in a foreign language and giving instruction to students who are learning to read. Audio is also effectively used where the real-world situation is audible: to play a stethoscope heart or lung sound appropriate to the location where the student chooses to "place his stethoscope," and to play the appropriate sound of a gas engine according to how well the student "repaired the engine."

External Output: Commercial devices which were not specifically designed for PLATO and/or devices of your own design can be connected to the terminal and thereby placed under computer program control. Briefly, here are two examples in which the terminal was made to "see" and "hear" by the use of custom-built external devices.

In a basic electronics laboratory, external devices "see" the positions of instrument control knobs set by the student and "see" the connections between the instruments and the circuit made by the student. With this information sent to the terminal, PLATO has a sufficient basis for highly individualizing lessons on measurement techniques.

In a music curriculum, external devices "hear" a passage played by a student playing a trumpet. The information sent to the terminal is the true pitch and duration of each note. With this information, the program can individualize instruction. It is rather interesting to see the music being displayed on the screen in standard notation as it is being played.

Figure 1.5 Keyset

Input Devices

Keyset: The keyset is very similar to a standard typewriter keyboard. The keyset consists of 64 physical keys which represent alphabetical, numerical, punctuation, and special-purpose characters and function keys. There are 126 standard characters and another 126 programmable characters, all of which can be accessed from the keyset.

The keyset is the most commonly used input device. Speed-typing ability proves useful to some authors, but students seldom feel the need to more than "hunt-and-peck" since most answers require a small number of keypresses. Additionally, the keyset is extremely versatile because it can be programmed to input complex answers from only a few student keypresses. For example, two keypresses can represent, i.e.,

can cause to be displayed, any of the following: a capital letter, a character of any foreign alphabet, the standard symbol for a note of music, the drawing of a nickel, dime, etc.; a chain of atoms showing the chemical bonds, a symbol for a capacitor, resistor, etc., and anything else you can represent by a pattern of dots on the screen.

Figure 1.6 Touch Panel

Touch Panel: Pressing the keys on the keyset is one way of entering data into the terminal, and touching a particular area of the screen can be another. The touch panel works on the "photoelectric eye" principle. In effect, it divides the screen area into 16 × 16 = 256 half-inch squares. When programmed to recognize touch responses, touching an area on the screen is the same as pressing a key.

Touch response is especially effective for young children, for any subject where the response task is pattern recognition, and where the real-world task would be identification by "pointing." For example, to learn to differentiate a penny from a nickel from a dime, etc., after an appropriate display is presented, the student is directed to "touch the dime." Similarly, he learns to identify "the frog," "the glass that has the most milk in it," "the square," etc. And often the frogs and dimes and glasses of milk do funny things that make him laugh when he touches the correct one.

Asking a student to indicate where he would place a probe in the patient's brain might elicit an answer of a highly technical name which, we will say, is correct. However, it may be useful to know whether the student believes the location of the area he names is where it actually is. From one or more slides the student could be required to locate and touch the named area.

External Input: External devices can input data to the terminal under program control. See "External Output," page 1.9 in this section.

References*

Terminal

1. Lesson "help"
2. A technical report: Jack Stifle, "The PLATO IV Student Terminal," CERL Report X-15.

Plasma Panel

3. Lesson "panel"
4. A technical report: D.L. Bitzer and H.G. Slottow, "The Plasma Display Panel--A Digitally Addressable Display with Inherent Memory," Proceedings of the Fall Joint Computer Conference, 1966, pp. 541-547.
5. A highly technical report: R.L. Johnson, D.L. Bitzer, and H.G. Slottow, "The Device Characteristics of the Plasma Display Element," IEEE Transactions on Electron Devices, Vol. ED-18, No. 9, Sept. 1971.

Slide Selector and Audio Device

6. A technical report: D.L. Bitzer, R.L. Johnson, and D. Skaperdas, "A Digitally Addressable Random-Access Image Selector and Random-Access Audio System," CERL Report X-13.
7. A technical report: Dominic Skaperdas, "A CERL Random-Access Audio Device," an informal report, CERL Library, 1974.

Keyset

8. Lesson "help"
9. Lesson "aids"- press DATA, type "keyset"

Touch Panel

10. A technical report: F.A. Ebeling, R.S. Goodhor, R.L. Johnson, "A Scanned Infrared Light Beam Touch Entry System," Proceedings of the Society for Information Display, June 1972.

External I/O

11. Device design considerations: see the Installation and Maintenance Group (217) 333-7466.
12. A project report: J.P. Neal and D.V. Meller, "Computer Guided Experimentation--A New System for Laboratory Instruction," CERL Report X-30.

* Explanation of Reference terms: A "Lesson" is a lesson available on PLATO. Reports with "X" numbers, e.g., "X-15," are available from the CERL Library.

2. The PLATO IV System

PLATO IV is the fourth PLATO system in the evolution of an economically viable computer-based education system. PLATO IV is being designed to accomodate more than 1000 terminals from one central computer. Since the system is constantly undergoing change, little can be said in a quantitative way that will be true for long; however, at the present time (Summer, 1974) there are several hundred terminals at about 70 locations throughout the U.S., Canada, and Europe. PLATO IV hardware was operational, in an early version by late 1971. PLATO IV has already been used to present 25,000 student contact hours of instruction at all school levels. There are presently more than 2,000 lessons available in over 60 subject matter areas.

A block diagram of the present PLATO IV system is shown in figure 2.1. The figure identifies the major hardware components and the communications options available for linking the components. The computer is diagrammed in figure 2.2. The "unit" of computer space referred to as a "lesson" may be thought of as the space required to store roughly 1 hour of instructional material.

The programming of the system is such that every "key" (keyset, touch, external input) that the student presses is processed by the most intelligent part of the computer. In this way, the computer can best decide what to do for every key: display the key character on the screen, erase the present display and write another, draw a figure on the screen, turn on an external device, judge the student's answer, or.... Because of this type of processing, the keyset becomes a device capable of far more than simply entering characters or a limited number of directives. In one program, the "a" key may simply cause an "a" to be displayed on the screen; in another, it may cause a branch to a different lesson, and yet in another may cause an alcohol group to be added to a chemical chain on the screen.

With all these capabilities, the response time of the system, i.e., the time delay between a key-press and an indication of some change due to the key-press, is nominally less than 0.2 seconds. This is a critical design parameter due to its psychological importance to the student, and this time will remain essentially the same even though the total number of terminals on the system will continue to increase.

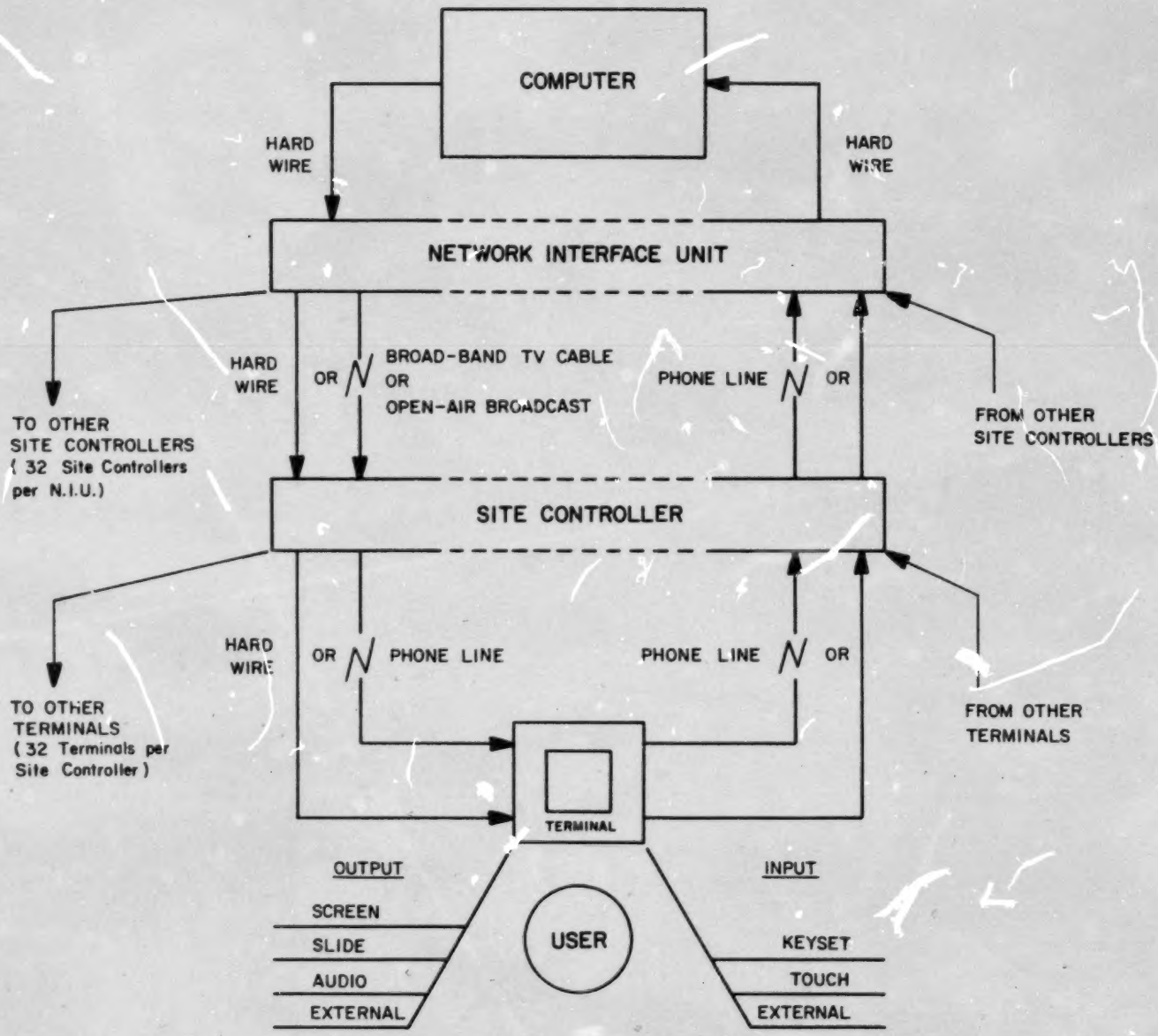


Figure 2.1 **Block Diagram of PLATO IV**

AA-055-1

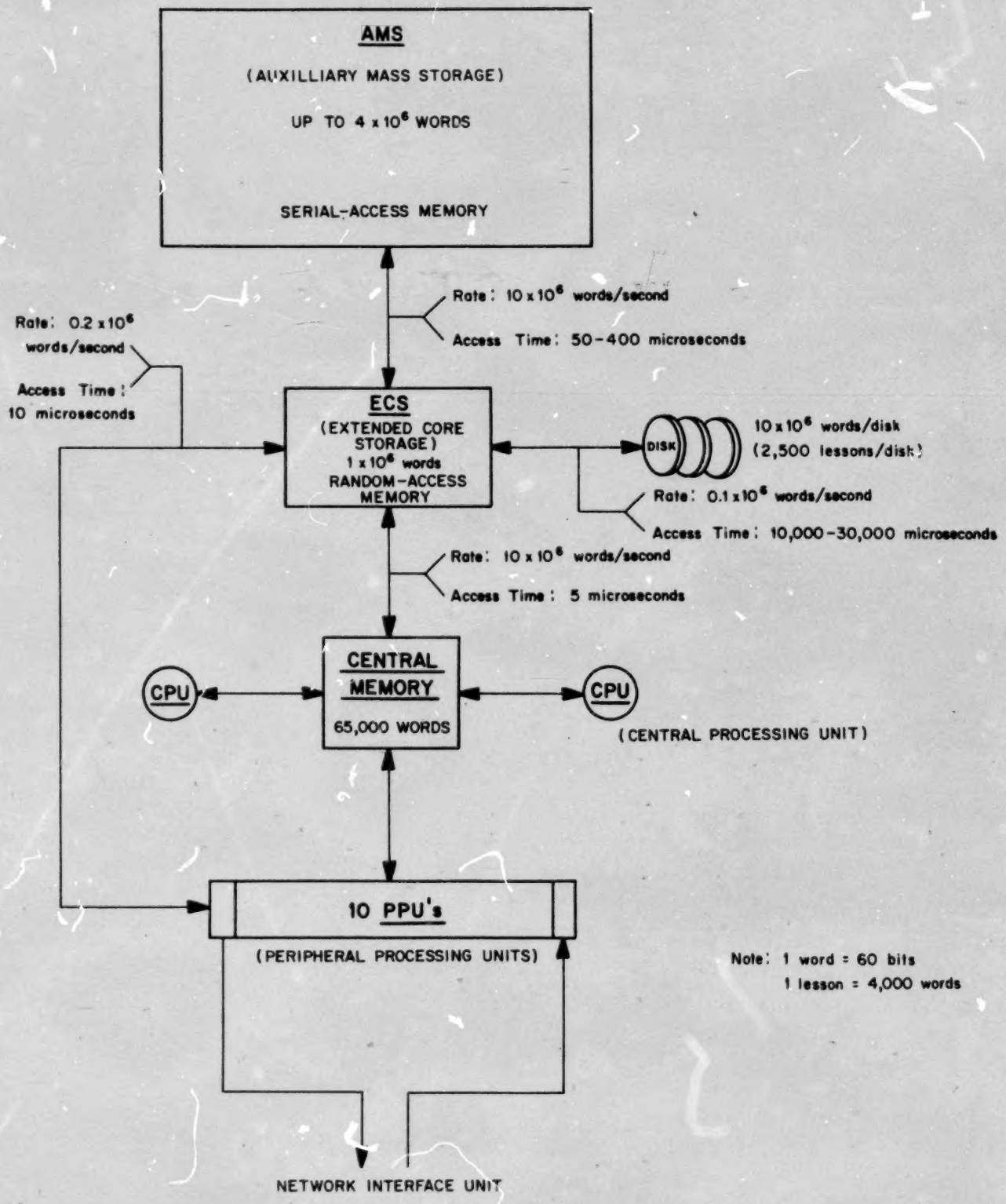


Figure 2.2 **The PLATO IV Computer**

AA-059-1

References*

The PLATO System

1. Lesson "network"
2. Lesson "aids"--select "v": The PLATO computer
   "1": General Introduction...
3. D.L. Bitzer and D. Skaperdas, "The Design of an Economically Viable Large-Scale Computer-Based Education System," CERL Report X-5.
4. E.R. Lyman, "PLATO Highlights," CERL.

The PLATO Hardware

5. A technical report: Jack Stifle, "The PLATO IV Architecture," CERL Report X-20.

Communications

6. A technical report: J. Stifle, D.L. Bitzer, and M. Johnson, "Digital Data Transmission via CATV," CERL Report X-26.
7. A technical summary: B. Sherwood and J. Stifle, "The PLATO IV Communications System," CERL Report X-44.

Curriculum Materials

8. Lesson "sample"
9. Lesson "topics"
10. Edit "catalog"
11. E.R. Lyman, "PLATO IV Curricular Materials," CERL Report X-41, number 2.

* Explanation of Reference terms: A "Lesson" is a lesson available on PLATO. Reports with "X" numbers, e.g., "X-15," are available from the CERL Library.

3. Getting On Line

PLATO can identify you only when you enter a name, course, and password. Entering this information at the proper displays is called the sign-on procedure.

Have your site director create an author space for you or contact:

Bill Golden (217) 333-2375

_____ _____

_____ _____

Remember to find out what course you are in. The first time you sign-on, you will select a password. Keep your password confidential.

The current sign-on procedure:

1. Find an operating terminal, and press the key labeled NEXT. A "Welcome to PLATO" display should be seen.
2. Type your PLATO name and press NEXT.
3. On the "name of your course" display, type the name of your course and press STOP while holding down SHIFT as described.
4. Type your password and press NEXT.
5. The "Author Mode" display is the entry point to the editor. Press HELP for further explanation. (For a list of available, already-written lessons, type "sample" and press DATA.)
6. When you are finished using a lesson, press STOP while holding down SHIFT.
7. While you are in the editor, press HELP for help.

Directions for using the Author Mode can also be found in "Introduction to TUTOR," Appendix B. For an introduction to authoring, start at the beginning of the manual and follow directions.

You are now on-line.

References

1. See a PLATO consultant.
2. J. Ghesquiere, C. Davis, and C. Thompson, "Introduction to TUTOR," CERL Manual.

Other:

4. Using PLATO IV

Introduction

The purpose of this section is to list references to information about PLATO IV. Because the system is in a state of development, space has been left after each heading so you may add your own references. References to lesson "aids" are especially subject to change since "aids" is the major on-line reference and changes as the system changes. After every personal reference, two lines have been inserted to accommodate the variety of site operations and assignments.

Some of the personal references include the notation "talk to" followed by a name and course. This information is required when you choose to contact an individual on-line, via the PLATO system. Directions for using the "talk" option are simple:

1. After you have signed-on, press TERM (hold down SHIFT and press the "TERM/ANS" key). Type "talk". Press NEXT.

2. Type the addressee's name. Press NEXT. Type the course name. Press NEXT.

3. The system will soon notify you as to whether or not contact can be made.

Even if you cannot contact the individual on-line, there is a section of "Notes" where a personal note can be left. Use the same name and course as you would use for the "talk" option. Your note will be stored and saved until it is seen by the addressee.

References to PLATO lessons are made in two ways: "Lesson (lesson name)" and "Edit (lesson name)." Type the name of the lesson on the Author Mode display. For "Lesson" (Student Mode), press DATA; to "Edit," press NEXT. When you edit lessons other than your own lessons, if the author allows access to his lesson at all, you will be placed automatically in an "Inspect only" mode of operation. "Inspect Only" allows you to see the lesson contents without the capability or worry of changing any part of the lesson.

There are four categories in this section: "General," "Author," "Instructor," and "Student." Category "General" is a list of materials that will be most helpful to the novice user and contains no material specific to authoring or running students. Items in this category should prove useful as a general introduction to PLATO. "Author contains items

helpful to writing lesson material. The category "Instructor" refers to a relatively new mode of using PLATO, and the references available at this time are minimal. The instructor mode would be used by an instructor who was not developing PLATO material but wished to use completed PLATO material in his course. Category "Student" lists all the steps necessary to run students and collect data. Although running students and collecting data may be done in instructor mode, items under "Student" refer specifically to the steps which authors use to test and improve their lessons.

General

Initial Course and Author Name Set-up and Help in General*

1. Contact:

Bill Golden	(217) 333-2375	"talk" to "golden" "s"

Other:

Lesson Examples

1. Lesson "sample": a broad index which gets you into PLATO lessons as a student.

Other:

* Contact your site director first. The phone number for help in general (217) 333-2375, is also (217) 333-CERL.

General (cont.)

Authors and subject matter areas

1. Lesson "topics": subject, topic, average lesson time
2. Edit "authors": author name, area of interest
3. Edit "catalog": subject, author name, author phone number
4. Elisabeth R. Lyman, "PLATO IV Curriculum Materials," CERL Report X-41.

Other:

Computers and PLATO

1. Lesson "computer"
2. Lesson "aids"--select "j": The PLATO computer
   "1": General Introduction...

Other:

General (cont.)

Keyset

1. Lesson "keyset"
2. Lesson "help"
3. Lesson "aids"--select "f": FONT characters

Other:

Terminology

1. Lesson "aids", press DATA, type the term (word or words)
2. Glossary (this document)

Other:

4.6

General

Demonstration of PLATO

1. Contact

Nancy Wood	(217) 333-6500
_____	_____
_____	_____

Other:

Author

Up-to-date General Resource List

1. Lesson "aids"--select "g": Author resources

Other:

Computer Space: lesson, course, datafile, router

1. See Appendix C, then have your site director contact:

Sheila Knisley	(217) 333-2375	"talk" to "sheila" "pso"

TUTOR

1. Lesson "aids": all commands and overviews of major areas; a primary reference
2. Lesson "tutor": interactive explanation of 30 basic commands
3. "Introduction to TUTOR": exercises coordinated with lesson "introtutor"
4. Programming Problems: 15 problems designed to teach the basics of TUTOR; contact the MTC group, (217) 333-7465, for packaged materials
5. Elaine Avner, "PLATO User's Memo, Summary of TUTOR Commands and System Variables," CERL, June 1975.
6. Bruce Sherwood, "The TUTOR Language," CERL, June 1975.

Other:

Author (cont.)

Consultants

1. TERM "consult" in Author Mode: on-line request for consultation
2. Edit "notes": stores message request for help; message will be answered by PLATO consultant(s)
3. PSO: PLATO Services Organization, contact:

Bill Golden	(217) 333-CERL	"talk" to "golden" "s"
_____	_____	_____
_____	_____	_____

Other:

Slides

1. Lesson "aids"--select "n": Microfiche...
2. Lesson "aids", press DATA, type "slide"
3. Contact:

Pat Stolarski	(217) 333-6210
_____	_____
_____	_____

Other:

Author (cont.)

Audio

1. Contact a PLATO consultant
2. Lesson "aids", press DATA, type "audio"

Other:

Touch

1. Contact a PLATO consultant
2. Lesson "aids", press DATA, type "touch panel"

Other:

Author (cont.)

Charset

1. Lesson "aids"--select "f": FONT characters...
2. Lesson "aids", press DATA, type "charset"

Other:

Micro

1. Lesson "aids"--select "f": FONT characters...
2. Lesson "aids", press DATA, type "micro"

Other:

Author (cont.)

Common

1. Contact a PLATO consultant
2. Lesson "aids", press DATA, type "common and storage"

Other:

Error Messages

1. Lesson "aids"--select "i"? Condense, lesson...

Other:

Author (cont.)

Print of Lesson or Data

1. Type "P" on the Author Mode display
   Prior to requesting a print, place directions as to where the print is to be sent in "block a," the very first lines of your lesson. These lines should be comments, i.e., the first character of the line is an asterisk (*), and the text should be entered in lower case.

Other:

TUTOR Routines

1. Lesson "aids"--select "h": Library...

Other:

Instructor

The instructor mode has been created for teachers who wish to use already-written PLATO lessons in a curriculum of their own design. An "Instructor" may create a PLATO student roster, specify the PLATO lessons available to the students on the roster, design the curriculum, select the types of student data collected, and monitor student progress. To "design the curriculum" means to decide which lessons should be seen in what order and which lessons may have their order chosen by the student.

General

1. Lesson "aids"--select "m": Instructor options
2. Lesson "rhelp"
3. Contact a PLATO consultant (217) 333-CERL

Other:

Instructor File

1. Have your site director contact:

Maureen Hoffman	(217) 333-CERL
_____	_____
_____	_____

Student

Scheduling Classes and Finding Class Space

1. Contact:

Tebby Lyman	(217) 333-6210	"talk" to "tebby" "pso"

2. Lesson "schedule": schedule of student use of terminals at several sites

Other:

Data Collection

1. Lesson "aids"--select "s": Student data,...

Other:

Student (cont.)

Router

1. Lesson "aids"--select "s": Student data,...

Other:

Measurement and Evaluation

1. PEER Group, contact:

   R.A. Avner (217) 333-6500

_____ _____

_____ _____

2. Lesson "stat": statistics routines
3. Lesson "multreg": multiple regression package
4. Lesson "area": data condensing and storing routines
5. Lesson "qarea": quick version of "area"
6. Lesson "opinion": polling student opinions
7. Lesson "evaluate": lesson evaluation aids
8. Lesson "terminal": terminal-use statistics

Other:

Student (cont.)

Checklist for Running Students with Data Collection

1. Request a course space which is large enough for the class or extend an existing course if needed.
2. Request a datafile to be linked to [illegible]se.
3. Create student records in the course.
4. Refer to lesson "aids"--select "s": Student data. Also check on, at least, the commands -dataon-, -area-, and -restart- in lesson "aids": press DATA, type command name.
5. Test the lesson as a student (i.e., with a student record set up for data collection) to see that data is actually being collected.
6. Practice using the data-sorting routines for selective display of data.
7. Arrange for student time on some terminals. If you are planning to use CERL's facilities, contact:

   Tebby Lyman (217) 333-6210

   _____ _____

   _____ _____

   Remember to check lesson "schedule."
8. Notify the students of time and place.

5. Maintenance

Although your terminal will require little maintenance, there are some steps you should take to avoid unnecessary problems.

1. You may clean the terminal screen with common window cleaners, but avoid ammoniated or gritty products.
2. You may move the terminal, but avoid rough handling.
3. If the room temperature exceeds 80°F, then TURN THE TERMINAL OFF IMMEDIATELY.
4. You may turn off the terminal when you leave for the day. Whenever you turn the terminal off, WAIT for at least 1 MINUTE before you turn it on again.

A time may come when the terminal does not seem to operate properly. If you cannot get a display on the screen, then run through the trouble-shooting procedure on the next 3 pages. If you determine that there is a malfunction, then use lesson "repair" to report it. If this is impossible, then contact:

For installation and maintenance help:

PLATO Installation and Maintenance (217) 333-7466

_____ _____

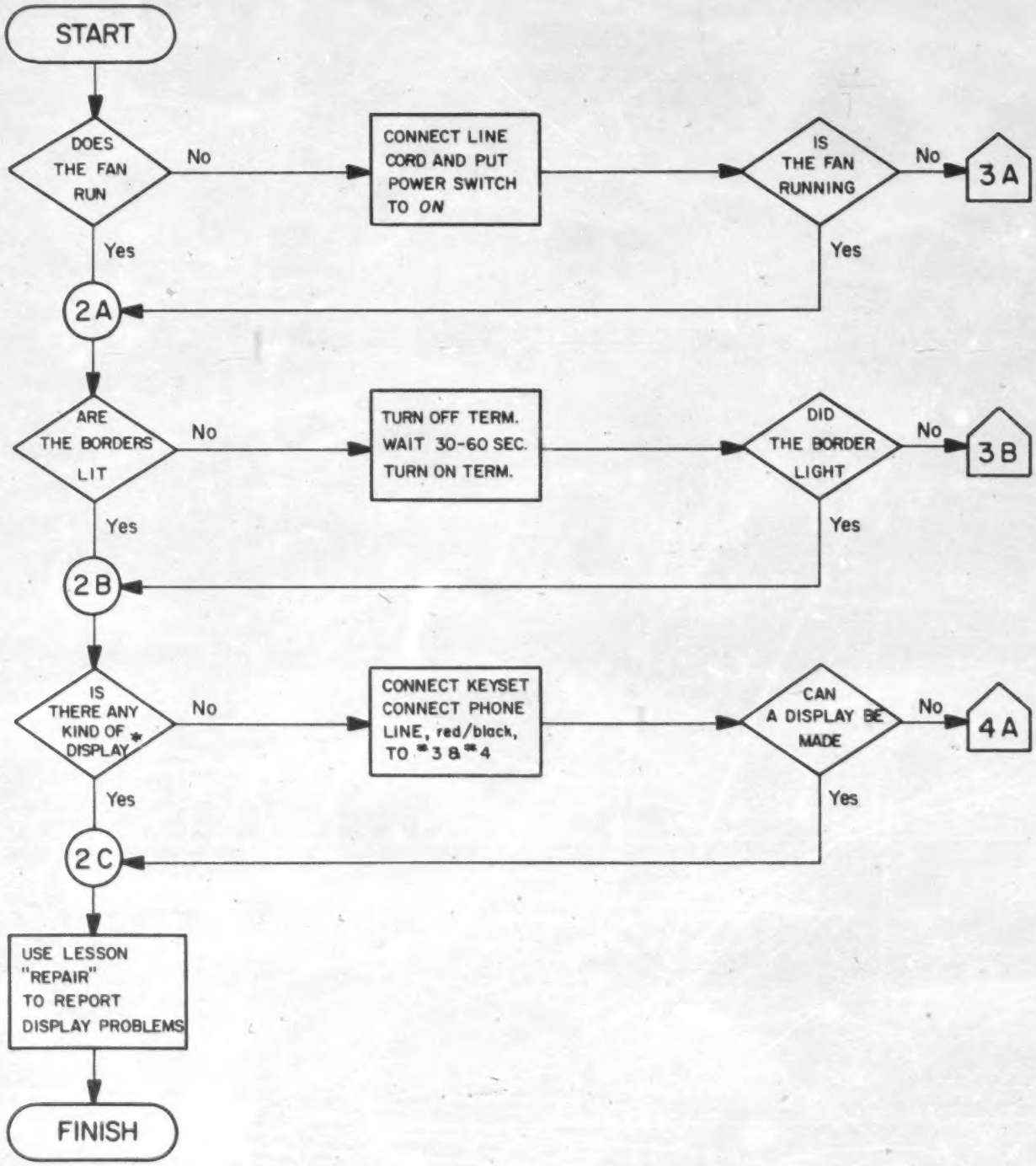
_____ _____

References

1. Contact: CERL Installation and Maintenance Group, (217) 333-7466
2. Lesson "tramp": latest on-line troubleshooting aids
3. Lesson "repair": to report a malfunction

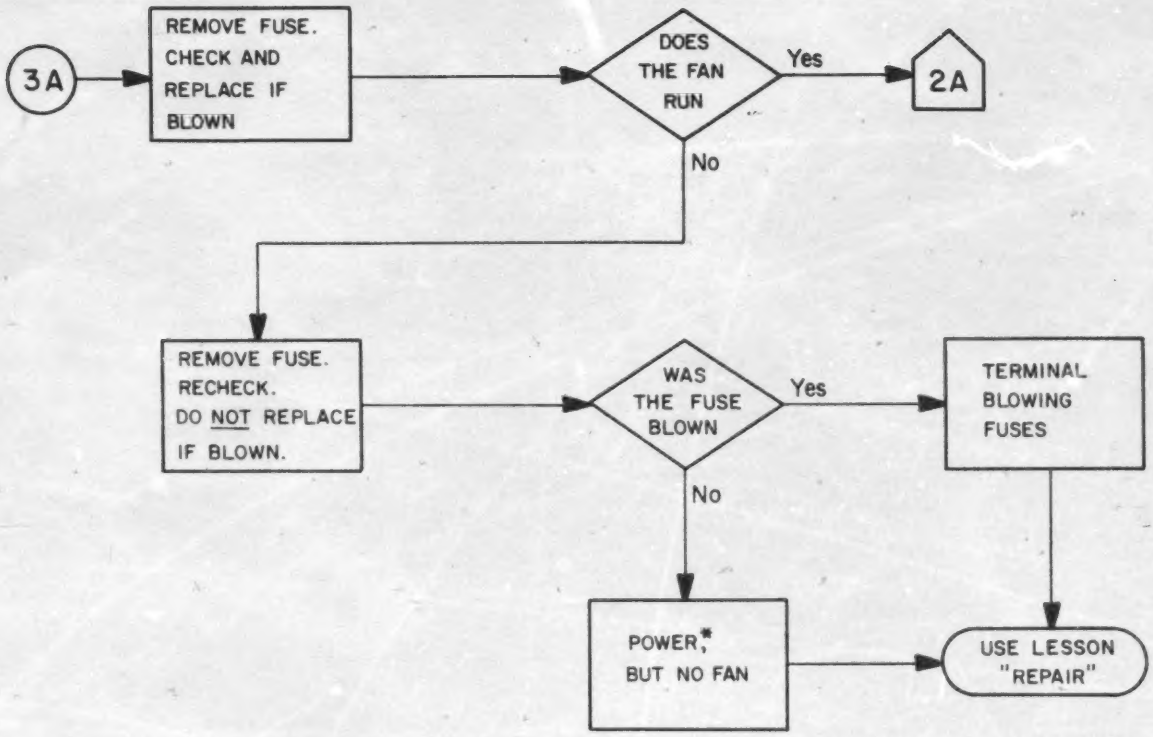
Other:

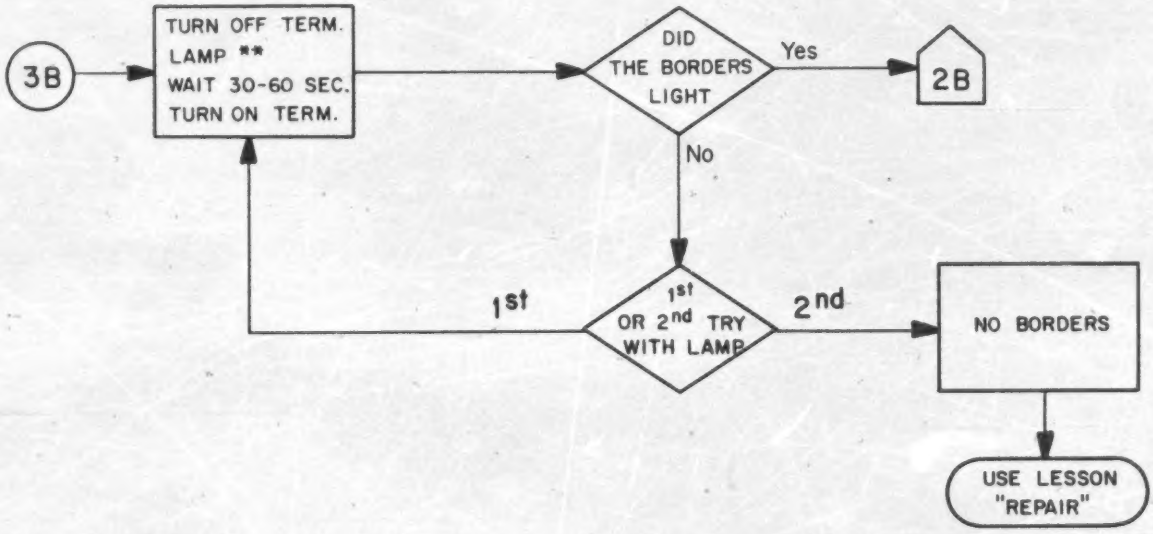
"NO DISPLAY" TROUBLESHOOTING PROCEDURE



* "ANY KIND OF DISPLAY" means something half-intelligible; something more than a dot or two on the screen.

AA-056-1

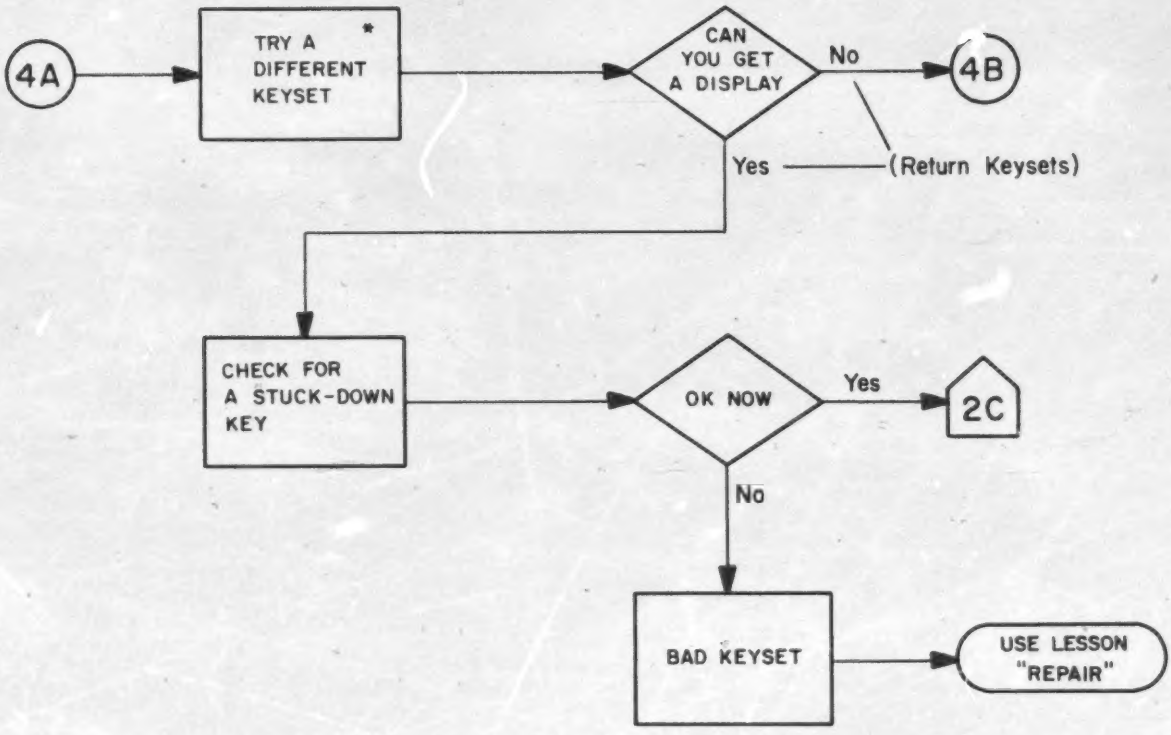


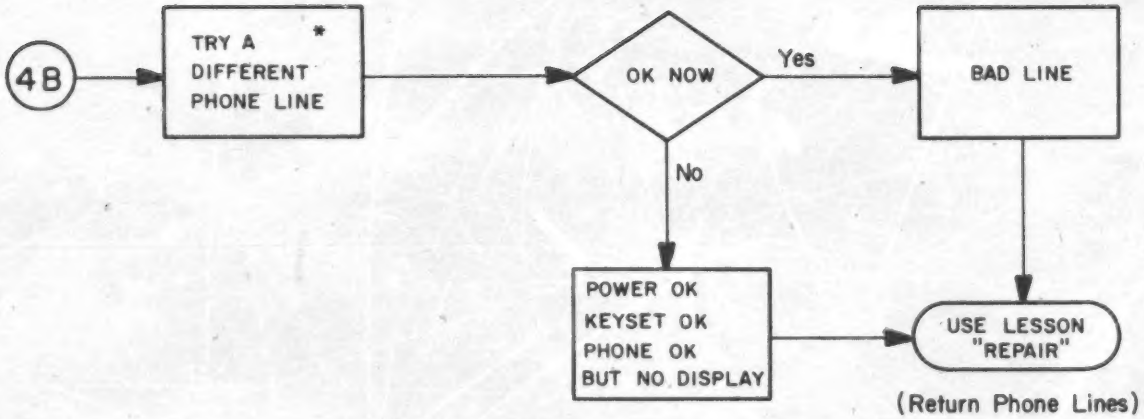


*Make sure the wall outlet you've plugged into is "hot".

**Place a lighted flourescent desk lamp very near the terminal screen.

AA-058-1





*Requires at least 2 terminals.

Appendix A: Glossary

AMS (auxiliary mass storage): A very large, medium-fast access memory for the storage of lessons.

CERL: The Computer-based Education Research Laboratory; the laboratory at the University of Illinois where PLATO has been developed.

Character: 1. Any of the alphabetic, numeric, or special symbols used in PLATO lessons
2. A definite amount of computer space--6 bits

Code (TUTOR code, program): The TUTOR language representation of a lesson; one or several TUTOR statements.

Column: The horizontal position at which something is displayed on the screen; see line.

Controller: See site controller

Display: See screen and graphics

ECS (extended core storage): The portion of computer memory where lessons being used by students are stored; a large, fast-access memory.

File: See lesson

Graphics: 1. The writing on the screen outside of standard characters; the screen display of lines, circles, and programmed characters
2. Any writing on the screen

Key: 1. A physical "button" on the keyset
2. The computer's representation of any input

Lesson: 1. A presentation for the purpose of education
2. A PLATO presentation; a PLATO lesson
3. An amount of computer space--about 4,000 words

Line: The vertical position at which something is displayed on the screen; see column.

Microfiche: A piece of film containing up to 256 images and the acetate foundation to which it is fastened; see slide.

Network Interface Unit: Prepares computer data for transmission on communication lines and accepts terminal data from communication lines and converts it to computer input; an encoder and decoder.

Notes: A system lesson used for leaving "scratch-pad" notes for authors, consultants, etc.; an option available from the Author Mode display.

NIU: See network interface unit.

Panel: See screen.

Plasma panel: See screen.

PLATO: The most current hardware/software/courseware system at CERL; the system being developed currently is named PLATO IV.

P-notes: See Notes.

Program: See code.

Screen (display): The 8 1/2" × 8 1/2" area on the front of the terminal where the orange dots are written.

Site:
1. Geographic or "location"--e.g., CERL, Kennedy-King College, Washington Grade School (Champaign), University of Southern California, etc.; a place where there are PLATO terminals.
2. Hardware--a certain terminal connected to a certain site controller; referred to as site (site controller) number and station (terminal) number.
3. Logical--a group of terminals regardless of geographic or hardware location which share a common part of the computer memory (ECS).

Site controller: A piece of hardware which links up to 32 terminals to the communication line or directly to the network interface unit; an encoder, decoder.

Slide:
1. Synonomous with microfiche.
2. One of the 256 images on one microfiche.

Station: See terminal and site.

Terminal:
1. A piece of hardware which contains a plasma panel and associated electronics; the device which provides an input/output capability to the user.
2. All the hardware associated with the end of a communication line--a "terminal," slide selector, audio, touch, keyset, and external devices.

TUTOR: The name of the computer language in which PLATO lessons are written.

Word: An amount of computer space--60 bits; 10 characters--see character.

Appendix B: Hardware Statistics

Terminal

Dimensions: 18 3/8" wide, 23 1/8" high, 25 5/8" deep

Power Requirements:
Electrical--115 V.A.C. 3-wire grounded 600 watts max.
Pneumatic (used by slide selector only)--18 p.s.i. nominal, .01 ft^3/minute

Communication Line: Hard wire or voice grade phone line

Pneumatic Line: Plastic tubing, 3/8" O.D., 1/4" I.D.

Heat Output: 1,700 BtuH (calculate heat output for 1 person at 400 BtuH)

Maximum Room Temperature: 80°F

Display Area: 8 1/2" square

Writing Speed: 180 characters/second, 60 connected lines/second

Display Characteristics: Orange characters on black background with capability of superimposing full-color slides, no "flicker" to the display, 512 × 512 matrix of individually addressable dots, 60 dots per inch.

Character Set: 126 standard English alphanumerics plus an additional 126 fully programmable characters. A character area is 8 dots wide by 16 dots high.

External Connectors: Terminal-mounted female connectors accept the following male mates (for terminals with serial number 261 and higher)--

External Input--Amp #1-480626-8
External Output--Amp #1-480616-9
Pins for the above--Amp #350036-1

Signal Levels--0 and 5 volt I.C. logic

Keyset

Dimensions: 14 5/8" wide, 3 1/4" high, 6 1/4" deep

Number of key stems: 64

Slide Selector

The slide selector is mounted inside of the top of the terminal.

Total Number of Slides per Microfiche: 256

Microfiche Dimensions: Film--4" × 4"
Acetate Mount--4" × 7 1/8"

Mean Access Time: 0.2 seconds

Touch Panel

The touch panel mounts on the front of the terminal.

Touch panel Thickness: 3/4"

Touch Matrix: 16 × 16 = 256 1/2" squares

Audio

Dimensions: 17" wide, 8" high, 18" deep

Power Requirements:
Electrical--115 V.A.C. 3-wire grounded, 100 watts
Pneumatic--18 p.s.i. nominal, .01 ft^3/minute

Audio Disk Dimensions: 15" diameter, .005" thick

Speed of Disk: 1 revolution/11 seconds

Total Available Message Time per Disk: 23 minutes
Maximum Length (uninterrupted): 45 seconds
Minimum Message Length: 1/3 second
Maximum Number of 1/3 Second Messages: 4096

Audio Bandwidth: 6 KHz

Audio Power Output: 1 Watt

Average Access Time: 0.3 seconds

Worst-Case Access Time: 0.4 seconds

Appendix C: Requesting File Space

Requests may be sent to "sheila" "pso" via p-notes or on talk, or by calling (217) 333-2375 if not available on-line.

The following information is required to complete your request.*

1. To create
   a. name of file
   b. type of file (lesson, course, datafile, instructor file, router)
   c. length of file (number of parts; each part = 7 blocks)
2. To shorten or lengthen
   a. name of file
   b. number of parts to be added or deleted
3. To destroy
   a. name of file
4. To re-name
   a. old file name
   b. new file name

NOTE: To shorten or lengthen a datafile, it must first be destroyed and then recreated at the desired length. Please make sure the file is cleaned out or contains no valuable information that would cause grief if lost when the datafile is destroyed.

* In an effort to save time, please make the following checks before making a request.

1. Check to make sure that the file name you have chosen is not already being used: enter the name at the Author Mode display.
2. Choose a name that meets the following conditions:
   a. It is at least 3 characters long.
   b. The first 2 characters are alphabetic.
   c. The initial character is not an "x".
   d. All characters are lower case.
   e. There are only alphabetic or numeric characters.
3. When extending a lesson, please check to see that there are at least 28 free words in the first block per part extension.
4. Course names can be only 8 characters long; other file names can be only 10 characters long.
5. When shortening a lesson, please check to see that the parts to be removed are empty.

INDEX

air supply--1.5, B.1, B.2
AMS--2.3, A.1
audio--1.8, 1.13, 4.9, B.2
AUTHOR Mode--3.1, 4.1, 4.7
authors--4.4

central memory--2.3
CERL--4.3, A.1
character--1.6, 1.10, A.1, B.1
  programmable--see charset
charset--4.10
classes (running students)--4.14, 4.16
clear switch--1.3
code--A.1
column--1.6, A.1
common--4.11
communication line--1.5, 2.2, 2.4
computer, the PLATO--2.2, 2.3, 4.4
  , memories--2.3
consultants--4.8
controller--see site controller
course--3.1, 4.3, 4.7, 4.16

data, collection--4.14
  , evaluation--4.15
  , print of--4.12
datafile--4.7, 4.16
demonstration of PLATO--4.6
disk memory--2.3
display--see screen

ECS--2.3, A.1
error--1.3
error message--4.11
evaluation of data--4.15
external--1.5, 1.9, 1.13, B.1

file--see lesson
focus--1.3
fuse--1.5

graphics--A.1

INSPECT ONLY Mode--4.1
instructor file--4.13
INSTRUCTOR Mode--4.1, 4.13

key--1.10, 2.1, A.1
keyset--1.10, 1.13, 4.5, B.1
keyset connector--1.3

lessons, space--4.7, A.1, C.1
  , topics--2.4, 4.4
  , to see--2.4, 3.1, 4.3
line--1.6, A.1
line, power cord--1.5

maintenance--5.1
memory--see computer, memories
micro--4.10
microfiche--1.3, A.1, see slide

name, sign-on--3.1
Network Interface Unit--2.2, 2.3, A.1
Notes--4.1, A.1

password--3.1
PEER group--4.15
phone line--see communication line
plasma panel--see screen
PLATO--1.1, 2.1, 2.4, A.1
pneumatic--see air supply
power cord--1.5
power requirements--B.1, B.2
power switch--1.3
prints--4.12
program--see code
PSO--4.8

repair, terminal--5.1, 5.2
router--4.7, 4.15

screen--1.3, 1.6, 1.13, A.2, B.1
serial number--1.3
sign-on--3.1
site--A.2
site controller--2.2, A.2
slide--1.7, 4.8, A.2
slide selector--1.7, 1.13, B.2
station--see site
STUDENT Mode--4.1, 4.14
students, running a class--4.14, 4.16

talk option--4.1
terminal--chap. 1, 2.2, A.2, B.1
touch panel--1.11, 1.13, 4.9, B.2
TUTOR--4.7, 4.12, A.2

word--2.3, A.2